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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application]About the manufacturing method of an organic electroluminescence display device, especially this invention is a sealing process which makes airtight the laminated structure body containing organic materials, and relates to the sealing plate and sealing method which suppress the flash of the adhesives at the time of pasting up a substrate and a sealing plate.

[0002]

[Description of the Prior Art]The example of composition of an organic electroluminescence display device is shown in drawing 8. Transparent conducting films, such as tin dope indium oxide (ITO) which is the hole injection electrode 10, are formed in the transparence or the translucent board 5 of glass etc. Electron hole transporting beds, such as tetraphenyldiamine (TPD), and electron transport layers, such as an aluminum quinolinol complex (Alq3), are laminated one by one as the organic thin film luminous layer 11 on it. This electron hole transporting bed and electron transport layer are a thin film about 50 nm thick, respectively, and are formed with a vacuum deposition method etc. On the organic thin film luminous layer 11, the small metal electrode of work functions, such as aluminum (aluminum) and magnesium (Mg), is formed as the electron injection electrode 12. By connecting DC power supply 18 to this hole injection electrode 10 and electron injection electrode 12, and sending current, the organic thin film luminous layer 11 emits light.

[0003]Since this laminated structure body 13 causes deterioration and exfoliation and causes a fall, a dark spot, etc. of luminosity with oxygen or moisture, it needs to isolate the laminated structure body 13 from the atmosphere with the sealing plate 1. Usually, the substrate 5 provided with the laminated structure body 13 in the container under a vacuum, or un-oxidizing and low humidity atmosphere environment and the sealing plate 1 which applied adhesives are

made to counter, and it arranges, and by the rise and fall holding the sealing plate 1 of a jig, the substrate 5 and the sealing plate 1 are contacted and it pastes up. Many UV cure adhesives with a small rise in heat at the time of hardening are used for adhesives, and ultraviolet rays are irradiated with and hardened in the state where the substrate 5 and the sealing plate 1 were contacted. The airtightness of the space 14 surrounded by the substrate 5 and the sealing plate 1 by this is carried out to a vacuum, or un-oxidizing and low humidity atmosphere, the laminated structure body 13 is isolated with the atmosphere, and the quality and long lasting organic electroluminescence display device 16 is obtained.

[0004]

[Problem(s) to be Solved by the Invention]In manufacture of the above-mentioned conventional organic electroluminescence display device, when pasting up a substrate and a sealing plate provided with the laminated structure body, adhesives overflowed the sealing plate outside and there was a problem which adhesives paste up on the jig holding a sealing plate. When an element was taken out after adhesion, this pastes up a jig and an element, and it becomes impossible to take them out, and it might damage the element. By the convex portion of the adhesives which remained in the jig, there was a problem it becomes impossible for the following sealing plate to install in a jig. When automation performed especially a sealing process within the container of a vacuum, or un-oxidizing and low humidity atmosphere, stop of a sealing process, atmosphere release in a container, removing operation of the adhesives adhering to a jig, etc. had to be performed, and also productivity was falling remarkably by the increase in the inferior goods by damage to an element.

[0005]When adhesives overflowed into the vacuum, or un-oxidizing and low humidity atmosphere space surrounded with the inside of a sealing plate, i.e., a substrate, and a sealing plate, there was a problem which degrades the characteristic of a laminated structure body. The adhesives protruded inside the sealing plate contact a laminated structure body, and degrade the characteristic. Although the adhesives overflowing into a vacuum, or un-oxidizing and low humidity atmosphere space are based also on the kind, the acrylic monomer in an ingredient volatilizes at the time of hardening, and acrylic UV cure adhesive degrades the characteristic of the organic layer which constitutes a laminated structure body, for example.

[0006]It is in this invention having been made in view of the above-mentioned technical problem, and providing the sealing method which does not fall the sealing plate and productivity which adhesives do not protrude the outside and inside a sealing plate in the sealing process which pastes up the substrate provided with the laminated structure body, and a sealing plate in manufacture of an organic electroluminescence display device.

[0007]

[Means for Solving the Problem]The 1st of this invention is the sealing plate of an adhesive application field which established a slot in one side at least at jointing of a sealing plate in

order to solve this technical problem.

[0008]In this example, when pasting up a substrate provided with a laminated structure body, and a sealing plate which applied adhesives to an adhesion region, adhesives inserted into a substrate and a sealing plate spread in an adhesion region, but it flows into a slot established in a sealing plate, and adhesives do not spread any more. Therefore, a flash of adhesives the outside or inside a sealing plate is lost.

[0009]When a sealing plate concerning the 2nd invention pastes up a substrate and a sealing plate by [of an adhesive application field] providing a sealant in one side at least, breadth of a binder is stopped and a flash of adhesives the outside and inside a sealing plate is lost. Since the airtightness of a vacuum, or un-oxidizing and low humidity atmosphere space provided with especially a laminated structure body is carried out by a sealant, degradation of a laminated structure body by volatile gas from adhesives can be suppressed.

[0010]A sealing plate concerning the 3rd invention is a sealing plate of an adhesive application field whose one side is a convex configuration at least, when pasting up a substrate and a sealing plate, breadth of adhesives is stopped and a flash of adhesives the outside and inside a sealing plate is lost.

[0011]A sealing plate concerning the 4th invention is a sealing plate which comprised either the outside of an adhesive application field or an inside fang furrow, a convex configuration and a sealant, and a flash of adhesives the outside and inside a sealing plate is lost.

[0012]A manufacturing method of an organic electroluminescence display device concerning the 5th invention is a sealing method of a laminated structure body which used a sealing plate of said 1st [the] - the 4th invention. When pasting up a substrate and a sealing plate, adhesives do not overflow jointing of a sealing plate, Adhesion with a sealing plate and a jig holding it is lost, and contact of adhesives to a laminated structure body or characteristic degradation of a laminated structure body by volatile gas from adhesives can be suppressed, and a quality and long lasting organic electroluminescence display device is obtained, without falling productivity.

[0013]

[Example]The example of the sealing process using the sealing plate concerning this invention is described using drawing 7 from drawing 1 below.

[0014]Drawing 1 is an explanatory view of the example of the 1st invention, and is the example which established the slot 2 in both the outside of the adhesive application field 3 of the sealing plate 1, and the inside. In order that the sealing plate 1 may arrange the laminated structure body 13 inside, it becomes the shape where the center became depressed and the jointing 4 with the substrate 5 is a field parallel to the substrate 5 to the circumference of a hollow. It has the two slots 2 across the adhesive application field 3 in the jointing 4. The size of the sealing plate 1 is 1 mm in 35 mm wide, 45 mm long, and height, for example, and the width of the

jointing 4 is 5 mm among those. The sealing plate 1 manufactured the 0.3-mm-thick stainless steel material in spinning. Although there are few gas evolutions and the stainless steel etc. which are rich in processability are preferred, a ceramics material, a resin material, etc. may be sufficient as the construction material of the sealing plate 1. The processing of the sealing plate 1 and the slot 2 can manufacture cutting besides spinning.

[0015]Drawing 2 is an enlarged drawing of the A-A vertical section of drawing 1. The semicircle type slot 2 0.5 mm in radius is on the both sides of the adhesive application field 3 of 2-mm width at the jointing 4. The size of this adhesive application field 3 and the slot 2 is not what it was set as the size which is not protruded from an adhesives fang furrow at the time of adhesion, and was restricted to the above-mentioned size. The slot of a square shape besides a semicircle type may be sufficient as the sectional shape of a slot.

[0016]The adhesives 6 applied optimum dose to the adhesive application field correctly by the computer program of the X-Y robot with the extracting apparatus (dispenser) in fixed quantity using ultraviolet curing nature adhesives.

[0017]Drawing 3 is what showed the adhesion process at the time of using the conventional sealing plate 17, the (a) figure is, just before pasting up the substrate 5 and the sealing plate 17, and the (b) figure shows the state where pasted the substrate 5 and the sealing plate 17 together and it pasted up. The sealing plate 17 which applied the adhesives 6 is held at the jig 7, and performs adhesion with the substrate 5 by rise and fall of the jig 7. Adhesion is performed under the atmosphere which introduced un-oxidizing and low humidity gas within the vacuum housing. Although the holding method of the sealing plate 17 had the method of holding the hollowed part of the sealing plate 17, and a method of holding the peripheral part 15 of the sealing plate 17, the method of holding the peripheral part 15 of the sealing plate 17 which a position gap of the sealing plate 17 does not produce was used for it. Drawing 3 shows the jig 7 holding the peripheral part 15 of this sealing plate 17. The adhesives 6 applied to the sealing plate 17 spread, when pasting the substrate 5, and as shown in the (b) figure, they are protruded the outside and inside the sealing plate 17.

[0018]The adhesives 8 protruded into the outside of the sealing plate 17 contact the jig 7 holding the sealing plate 17, and are hardened at the time of UV irradiation. The organic electroluminescence display device 16 pasted up on the jig 7 cannot be easily taken from the jig 7, but returns the inside of a vacuum housing to atmospheric environment, and takes out the organic electroluminescence display device 16 from the jig 7. The organic electroluminescence display device 16 may be damaged at this time, and it becomes inferior goods. The adhesives which remained in the holding jig 7 need to remove all the remaining adhesives in order to bar maintenance of the following sealing plate. Thereby, productivity falls remarkably.

[0019]The adhesives 9 overflowing into un-oxidizing and the low humidity atmosphere space

14 which has the laminated structure body 13 by which airtightness was carried out with the inside 5 of the sealing plate 17, i.e., a substrate, and the sealing plate 17 contact the laminated structure body 13, degrade the characteristic, and reduce the quality and the life of the organic electroluminescence display device 16.

[0020]Drawing 4 shows the adhesion process at the time of using the sealing plate 1 of this invention. The adhesives 6 are applied to the adhesive application field 3 of the jointing 4, and it pastes together to the substrate 5. At the time of adhesion, although the adhesives 6 spread the outside and inside the sealing plate 1, the adhesives 6 flow into the slot 2 and they do not protrude them into the outside of the slot 2, or the inside. The adhesives 6 do not contact the jig 7 which held the sealing plate 1 by this, and the organic electroluminescence display device 16 after adhesion can be easily taken out from the jig 7. Stopping a sealing process is lost and productivity is not fallen. The long lasting and quality organic electroluminescence display device 16 can be manufactured without losing the flash of the adhesives 6 inside the sealing plate 1, and deteriorating the laminated structure body 13.

[0021]Drawing 5 is an explanatory view of the example of the 2nd invention, and is the example which had the sealant the outside and inside the sealing plate 19. [of the adhesive application field 3] The sealing plate 19 was produced by the spinning of the 0.3-mm-thick stainless steel material like Example 1. The adhesive application field 3 was inserted into the jointing 4 of the sealing plate 19, and the sealant 20 has been arranged to both the outside and inside.

[0022]Drawing 6 is an enlarged drawing of the B-B vertical section of drawing 5. To the jointing 4, the sealant 20 0.6 mm in width and 0.25 mm in height has been arranged at the both sides of the adhesive application field 3 of 2-mm width. The size of this adhesive application field 3 and the sealant 20 is not what it was set as the size which adhesives do not protrude from a sealant at the time of adhesion, and was restricted to the above-mentioned size. Round shape besides the above-mentioned square shape may be sufficient also as the sectional shape of a sealant.

[0023]The black lead sheet was used for the sealant 20. A sheet material may have few gas evolutions, and what is rich in elasticity and pliability, and also is rich in processability in order to enlarge a touch area with the substrate 5 or the sealing plate 19 may be preferred, and metal, such as resin, such as a polytetrafluoroethylene besides a black lead sheet, and aluminum, may be sufficient as it.

[0024]The sealant 20 is well stuck with a substrate by considering it as a convex configuration in a height of 0.1 mm, for example on the jointing 4 surface, pushing and being crushed by contact with a substrate in the case of adhesion.

[0025]The sealant 20 is the structure which gets into the slot of the jointing 4 of the sealing plate 19, and a sealant does not shift at the time of adhesion. At the time of adhesion, when

there are few gaps of a sealant, the structure which does not consider it as said fit lump structure, but puts a sealant on jointing may be sufficient. A sealant can also be directly formed in jointing of a sealing plate by thin-film-forming methods, such as paint, plating, thermal spraying or vacuum deposition, and sputtering process.

[0026]Drawing 7 shows the adhesion process at the time of using the sealing plate 19 of this invention. The adhesives 6 are applied to the adhesive application field 3 of the jointing 4, and it pastes together to the substrate 5. At the time of adhesion, although the adhesives 6 spread the outside and inside the sealing plate 19, the adhesives 6 are interrupted by the sealant 20, and cannot spread any more, and they do not protrude them the outside and inside the sealing plate 19. The adhesives 6 do not contact the jig 7 which held the sealing plate 19 by this, and the organic electroluminescence display device 16 can be easily taken out from the jig 7. The flash of the adhesives 6 inside the sealing plate 19 is lost, the laminated structure body 13 is not contacted, and also since the airtightness of un-oxidizing and the low humidity atmosphere space 14 surrounded with the substrate 5 and the sealing plate 19 is carried out by the sealant 20, the volatile gas emitted from the adhesives 6 is isolated with the laminated structure body 13. For this reason, the long lasting and quality organic electroluminescence display device 16 can be manufactured, without deteriorating the laminated structure body 13.

[0027]Although the sealing plate of the 3rd invention is not illustrated, it is a sealing plate which has a section of a convex configuration across the adhesive application field 3 on the jointing 4 surface as shown, for example in drawing 6 of Example 2. It is manufactured by spinning or cutting as well as the above-mentioned example using a stainless steel material etc. The width, the height, and shape of heights on the jointing surface are set as the size which adhesives do not protrude from a sealing plate at the time of adhesion.

[0028]The composition of a sealing plate with the slot 2 of the sealing plate 1 shown in the above-mentioned Example 1, the sealant 20 of the sealing plate 19 shown in Example 2, and a convex configuration, When there is not the thing restricted to this but little degradation of the laminated structure body 13 according to the volatile constituent of the adhesives 6 for example, the aforementioned slot 2, the sealant 20, and convex configuration can also be carried out only outside. When the laminated structure body 13 deteriorates remarkably by the volatile constituent of the adhesives 6, the slot 2 may be established in the outside of the adhesive application field 3, and a sealant may be provided inside.

[0029]

[Effect of the Invention]They are a slot, a convex configuration, or sealant ***** at least to one of the two of an adhesive application field in jointing of a sealing plate which isolates a laminated structure body from oxygen and the moisture in the atmosphere in the sealing process of an organic electroluminescence display device in this invention as mentioned above.

Therefore, the flash of adhesives can be abolished, the adverse effect to the laminated structure body by the generating gas from the adhesion trouble and adhesives of a sealing plate and a sealing plate holding jig can be reduced, and it can do [manufacturing a quality organic electroluminescence display device with sufficient productivity, or].

[Translation done.]